CLAIMS

1. A non-thermal plasma reactor characterized by:

an element prepared from an extruded curved substrate comprising an outer wall surrounding a plurality of concentric channels separated by dielectric barriers, said element comprising:

a plurality of exhaust channels for passing a flow of gas therethrough; and

a plurality of conductor channels, said conductor channels having alternating polarity, each connected to its respective polarity via bus paths.

2. The reactor of claim 1, wherein said curved substrate comprises a dielectric substrate material selected from the group consisting of alumina, dense cordierite, mullite, titania, plastic, materials having a high dielectric constant, and combinations thereof.

3. The reactor of claim 1, wherein said exhaust channels are thick relative to said conductor channels.

4. The reactor of claim 1, further comprising:

a catalytic coating disposed on interior walls of said exhaust channels.

5. The reactor of claim 1, wherein said conductor channels are coated with conductive media selected from the group consisting of silver inks, aluminum ink, and copper inks, and combinations thereof.

6. The reactor of claim 1, further comprising:

structural support ligaments, wherein said ligaments comprise an integrally extruded portion of said curved substrate.

7. The reactor of claim 6, wherein at least one structural support ligament serves as a substrate for said conductive bus paths.

8. The reactor of claim 6, wherein portions of said structural support ligaments are removed from said conductor channels in order to ensure continuous conductive paths along said conductor channels.

9. The reactor of claim 6, wherein face ends of said structural support ligaments disposed in said conductor channels have a conductive coating disposed thereon.

10. The reactor of claim 6, wherein said structural support ligaments are lined up between said conductor channels and said exhaust channels so that there are essentially no uncoated areas in said conductor channels.

11. The reactor of claim 1, further comprising:

an electrical insulating sealant.

12. The reactor of claim 1, wherein said curved substrate comprises a shape selected from the group consisting of curved, swept, round, oval, racetrack, and trapezoid shapes.

13. The reactor of claim 1, wherein said curved substrate comprises a shape comprising a large frontal area and a length that is short relative to said frontal area.

14. The reactor of claim 1, wherein said curved substrate comprise a shape having a frontal area that is sufficiently large to achieve a low backpressure and a length adjusted to achieve a desired gas space velocity in accordance with a particular engine emission system.

15. The reactor of claim 1, comprising wire connections made directly to said bus paths.